

CITY OF PHILADELPHIA
Department of Public Health
Public Health Services
Air Management Services

Statement of Basis

To: File
From: Biji Pandisseril
Date: 01/04/10
Subject: Sunoco 1332 H4000/401 SCR Plan Approval 09040 Statement of Basis

Description:

The facility is installing a SCR system on a shared stack of H400 and H401 process heater at the 1332. The SCR system is used to meet the NOx reduction requirement of the Consent Decree Order No. 05-CV-2866.

Summary:

The facility is a major source as due to the facility's potential to emit Volatile Organic Compounds (VOC), Nitrogen Oxides (NOx), Particulate Matter less than 10 microns (PM-10), Sulfur Oxides (SOx), Carbon Monoxide (CO), and Hazardous Air Pollutants (HAPs).

Sunoco is installing the SCR on the common exist stack of both heaters (H400/401) to achieve a 112 tpy of NOx reduction from the 2001-2002 baseline required by the Supplemental Environmental Projects (SEP) section of the Consent Decree Order No. 05-CV-2866. The SCR will achieve NOx reduction of 136.9 tpy, giving an additional 24.9 tpy of NOx reduction that will be used by the Sunoco as credits on future projects or meet other parts of the Consent Decree as applies.

Emission Calculations:

Following is the 2001-2002 NOx emissions used in the Consent Decree:

^^^^	Max Heat Input (MMBTU/hr)	2001 NOx Emission (tpy)	2002 NOx Emission (tpy)	2001-2002 Avg (tpy)
1332 H-400	198	81.9	81.8	81.9
1332 H-401	233	115.7	119.7	117.7
^^^^(Table from Consent Decree-Baseline year 2001-2002)				199.6

The facility with the manufacturers guarantee will meet 136.9 tons of NOx reduction. With an annual emission from the both heaters after controls of 62.4 tons per year.

NOx Emissions			
Average Max Heat Input	215.5	MMBTU/hr	
SCR reduction to be achieved	136.9	tpy	
NOx after control^^^	62.7	tpy (annual emissions)	
NOx after control	0.066	lbs/MMBTU	

NOx emissions (used in permit)	60 0.06	ppmvd @ 0% O2 (emission rate requirement) lbs/MMBTU~
`` difference from baseline and SCR reduction ~ Assuming Fuel Gas has same F-factor as natural gas		

Following is the PM emission calculation using the RACT emission factor and heat input capacity.

	Heat Input (MMBTU/hr)	PM emission factor (lb/MMBTU)``	PM Emissions (lbs/hr)	PM Emission (tpy)
H-400	198	1.70E-01	33.66	147.43
H-401	233	1.90E-01	44.27	193.90

``From RACT Plan Approval 8/1/2000

``Assures compliance with AMR II, Sec V.1.; and 25 PA Code 123.11(a)(2) for heater 50 MMBTU/hr < x < 600 MMBTU/hr

Emission affected by the installation of SCR.

Pollutant	NOx SEP *	NOx PSD **	H2SO4	NH3
tpy avg from baseline yr	199.6	211	0	0
tpy future potential	62.7	62.7	2.75	5.1
tpy NOx emission change	-112 *^	-36.3	2.75 *~	5.1 *~

* Baseline year for SEP NOx reduction purposes is 201/2002 as per Consent Decree

** Baseline year for PSD/NSR is 2005-2006. But the Consent Decree paragraph 99 states that NOx reduction used to meet the consent decree cannot be used for PSD/NSR calculation so 112 tons reduced

*^ 24.9 tons excess over the required in consent decree which is to be used on future projects. Therefore only 112 is required by Consent Decree

*~ H2SO4 and NH4 uses vendor's guarantee of 0.627 lbs/hr and 1.16 lbs/hr at max RACT firing rate.

NSR/PSD

NSR or PSD has not been trigger. The project is used to achieve and NOx reduction and only emission increase is for incremental stream. As seen below the thresholds were not exceeded. The baseline year used for PSD/NSR is 2005-2006.

Emission Changes for 1332 H400/401 NOx reduction project.

Source	NOx	SO2	CO	PM/PM10/PM2.5	VOC	H2SO4	NH4
SCR System **	-36.3	20.55	42.33	3.83	2.77	2.75	5.1
Incremental Steam	0.87	0.23	0.48	0.04	0.03	-	-
Total	-35.43	20.78	42.81	3.87	2.8	2.75	-
PSD/ NSR Threshold	25	40	100	25/15/10	25	7	-
** No credit is allowed for the 112 tpy NOx reduction required by the SCEP							

Location	Permit No.	Unit	Eff. Date	Net Emission Change (tpy)		
				VOC	NOx	PM 2.5

Pt. Breeze	02184	Tier II Gasoline	2003	0	0	0	Triggered NSR NOx
Pt. Breeze	03124	433 Alkylation	2004	0	0	0	
Pt. Breeze	03163	869 Alkylation Reactivation	2004	0	0	0	
Pt. Breeze	04208	Emergency Generator	2004	0	0	0	
Girard Pt. / Pt. Breeze	04237	865 ULSD	2004	0	0	0	Triggered NSR VOC
Girard Pt. / Pt. Breeze	04322	1232 Flue Gas Treating and Expansion	2006	0	0	1.23	
Pt. Breeze	05219	866 Unit Modification for ULSD mode	2006	0	0	0	
Pt. Breeze	Application	868 Feed Increase and Conversion Increase	2006	0	0	0.15	
Girard Pt	N/A	Demin.. Valves and flanges at 433/869	2006	0	0	0	Triggered NSR VOC & NOx
Girard Pt	06050	433 HFAU Process Improvement Project	2006	0	0	1.88	
Girard Pt	07026	231 Imported Jet Project	2007	0	0	0.51	
Girard Pt / Pt. Breeze	06144	859 Reactivation Project	2008	0	0	7.5	
Girard Pt	08080	No 3 Boilerhouse NOx Reduction	2008	12.52	-	-	
Pt. Breeze	08255	Unit 865 Improvement Project	2008	0.97	9.42	-	
Girard Pt	RFD	Unit 433 KOH Treater Lines	2008	0.01	0.19	0.01	
Girard Pt	Application	SRTF Terminaling	2008	4.39	7.24	0.4	
Pt. Breeze	RFD	Unit 866 Stripper Valve	2008	0.3	0.06	0	
Girard Pt	Application This	Unit 137 RFG Changes	2009	0.02	0	0	
Girard Pt	Application	Unit 1332 Heater SEP	2009	2.8	0	3.87	
				21.01	16.91	n/a	

PM 2.5 contemporaneous period starts from 2005, the year of non-attainment status

(PM2.5 only required if project itself leads to significant increase of 10 tpy

NOx reduction of -35.43 tpy in 1332 PSEP project not needed for netting of this project and reserved for future ERC or credit to consent decree.

NSPS

The SCR project does not meet the definition of modification for NSPS subpart J or Ja but the facility is required to meet the H2S NSPS subpart J requirement as conditioned in the Consent Decree.

Permit Requirements:

The heaters are subject to 0.06 lb/MMBTU @ 0% O2 on a 365 rolling operating day basis. This NOx emission ensures that the heater will be below 62.7 tpy requirement in a rolling 12 month period. Sunoco will install a CEMs system to ensure a continuous monitoring and recording of NOx and O2 concentration to ensure compliance in accordance with the Consent Decree. The NOx emission will be calculated on a lb/MMBTU on a daily basis using

$$\text{Lb/MMBTU} = (\text{ppmdv}) * (1.94 \times 10^{-7}) * (\text{F-factor}) * (20.9 / (20.9 - \% \text{O}_2))$$

where the F factor = scf flue gas per MMBTU calculated daily from daily fuel gas samples.

The facility shall operate the SCR system when operating the heaters. When SCR is down (when catalyst is replaced or to do maintenance or low firing rates of heater) the heaters will be subject to 0.156 lb/MMBTU as proposed in the RACT Plan Approval. The emission during down times will be calculated using the RACT emission factors.

The heater will be subject to NH₄ emission limit 1.16 lbs/hr based on manufacturers guaranteed which is considered to be BAT. Sunoco will demonstrate compliance via a stack test, develop NH₄ emission factor that will be used calculated NH₄ emission, and NH₄ injection rate will for compliance monitoring.

The heater will be subject to PM emissions of 0.17 lb/MMBTU for H401 and 0.19 lb/MMBTU for H400 as determined compliance with PA Code. 123.11(a)(2) and assures compliance with AMR II.Sec V.

from AP-42: PM₁₀ = 7.6 lbs/MMCF burned
for natural gas: 1020 BTU/SCF = 1020 MMBTU/MMCF
PM₁₀ = 7.6 lbs/1020 MMBTU = 0.01 lbs/MMBTU
PM₁₀ = (0.01 lbs/MMBTU/ 9,190 dscf/MMBTU) *(7000 g/ 1 lb)
since 0.008 gr/dscf < 0.04 gr/dscf, compliance with 25 Pa Code 123.11(a)(2) for PM

The heater are subject to CO emission of 1% by volume of exhaust gases as required by AMR VIII. The following calculation shows that the heaters will exceed the above limit.

from AP-42: CO = 84 lbs/1000000 scf = 84 lbs/1020 MMBTU = 0.082 lbs/MMBTU
F Factor from facility's 2008 emission report = 951 scf/BTU
CO = 0.082 lbs/951 dscf = 8.6x 10⁻⁵ lbs/dscf

from AMR VIII,
CO limit = 1% by volume = 10,000 ppm which converts to 7 x 10⁻⁴ lbs/dscf
since AP-42 conversion < 7 x 10⁻⁴ lbs/dscf, heaters are in compliance with AMR VIII (normal operation)

Therefore the heater will be in compliance with the CO limit at all times. (The project only involves in construction of SCR on the exhaust of the existing heater)

The SCR is also subject to maintain an optimum temperature of 750 F as required by the catalyst system. The temperature will be monitored and recorded on a continual basis.

The heaters are subject to 186 MMBTU/hr for H400 and 233 MMBTU/hr for H401 as required by the RACT Plan Approval. The facility is to monitor and record fuel type and fuel usage. In addition, the heater must comply with NSPS Subpart J in accordance with the Consent Decree. The fuel gas must comply with H₂S requirement of the NSPS and must be monitored using CEMs.